IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	10/678,636
Applicants	:	Peter Ernest Page et al.
Filed	:	June 10, 2003
Title	:	A METHOD OF SUSPENDING, COMPLETING AND WORKING OVER A WELL
Group Art Unit	:	3672
Examiner	:	Letoria House Confirmation No. : 7805

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

1. I, Paul Anthony Kelley, resident at 33 Clydesdale Street, Champion Lakes, WA 6111, Australia, am familiar with the subject matter of the above-identified application and the invention described herein ("the present invention"). I am not an inventor of the present invention.

2. I am currently employed as Completion Design Team Leader by Woodside Energy Limited, the assignee of the above-identified application. I hold a Bachelors degree in Electronics Engineering and have worked in the oil and gas industry since 1990 in the area of production technology and completions.

3. During well completions, suspension and work-over operations, we are obliged by law to ensure that two independently verifiable barriers are in place at all times to retain control of the well. The role of these barriers is to stop any flow of hydrocarbons up and out through the bore of the well. Each of the first and second well control barriers has to be able to at least hold reservoir pressure applied from below the barrier.

4. It is a longstanding and well-accepted industry practice when suspending a well to position one of the two well control barriers below the anticipated depth of the lowermost end of the completion string ("the deep set plug") with the second well control barrier being placed towards an upper end of the well-bore ("the shallow plug") to ensure that the first and second well control barriers are a long way apart. In order to complete a well, the shallow plug has to be removed as it presents an obstacle to the installation of the tubing or completion string. The deep set plug is left in place until it comes time to flow the well and start production. Before removing the shallow plug, a BOP stack must be installed at the well to satisfy the statutory requirement that two independently verifiable well control barriers be in place at all times. The BOP stack has a series of shut-off valves that we can use to serve the function of the second well control barrier. When the well is completed, a plug is typically placed in the tubing hanger to allow for the removal of the BOP stack.

5. There are two key drivers behind this longstanding standard industry practice of using one deep set plug and one shallow plug when suspending a well. The first driver is that the use of a shallow plug reduces the cost associated with using wireline to set or retrieve the second well control barrier. The second driver is that placement of the first and second well control barriers as far apart as possible makes it easier to independently verify the integrity of each of the two barriers.

6. Using standard industry practice, we set the deep set barrier in the well and then test that the first barrier is not leaking by filling the well-bore with a fluid and pressurising the column of fluid to a given pressure. Due to the compressibility of the fluid or entrapped gas, the pressure typically drops over a short period of time before leveling off. If the deep set barrier is leaking, the pressure does not level off and we know that remedial action must be taken. When the integrity of the deep set barrier has been verified, we run and set the shallow plug and repeat the procedure to test the integrity of the shallow barrier. Because the first and second well control barriers are placed so far apart, it is easy for us to identify which one is leaking, if this occurs.

7. The decision by the Inventors of the present invention to use two deep set barriers instead of one deep set barrier and a shallow barrier overcomes the need to remove one of the barriers running the completion into the well. This in turn means that we no longer need to use the BOP stack. The Inventors use a transducer placed between the first and second deep set barriers to allow us to independently verify that both the first and the second deep set barriers are able to hold reservoir pressure. We would not be able to use two deep set barriers for well control if we were unable to independently verify their integrity.

8. The present invention is a remarkably simple idea which has significant flow-on advantages over standard industry practice in terms of time and money. The running and retrieval of a BOP stack is one of the costliest operations associated with sub-sea well construction. As a well operator, we hire the BOP equipment and the specialized vessels that deploy these BOP stacks from external third parties at an average cost of approximately half a million US dollars per day depending on the size and type of rig being deployed and the country in which the operation is taking place. Any procedure that allows us to reduce the costs associated with deploying a BOP stack is extremely attractive to us.

9. The present invention was used successfully for the drilling and completion of 12 wells at Chinguetti, off the coast of Western Africa in 2005. Chinguetti is a particularly deep water location and we calculated that we would have needed approximately seven days to run and retrieve the BOP from this depth. Use of the present invention at Chinguetti allowed us to avoid the need to use the BOP during suspension and completion operations at an approximate saving of USD 3,000,000 per well in rig time for each of the 12 wells at this location. We were also able to eliminate a separate trip per well to independently land the Christmas tree with an additional saving of approximately 5.5 days of rig time for this field.

10. The present invention was also used successfully for the drilling and completion of 13 wells at Enfield, off the coast of Western Australia in 2005. Use of the present invention at Enfield allowed us to avoid the need to use the BOP during suspension and completion operations at a saving of AUD 2-3 million per well for

each of the 13 wells at this location. We were also able to eliminate a separate trip per well to independently land the Christmas tree with an additional saving of approximately 6 days of rig time for this field.

11. During our drilling operations at both Enfield and Chinguetti, we were able to suspend the wells with the two deep-set barriers in place. When we came back to complete the wells, we topped up the well bore with completion fluid and pressure tested to verify the two deep-set barriers. The pressure reading from the transducer placed between the first and second deep-set barriers in the present invention allowed us to independently verify both of the two deep-set barriers.

12. I have read and understood the specification filed for US patent application 2003/0196820 ("the Patel reference"). I fail to see why the Patel reference was considered to be relevant to the present invention. The Patel reference refers to completions but in a different context to that of the present invention. The Patel reference describes the use of barriers to isolate multiple zones in a producing well. In contrast, the present invention relates to the use of barriers to maintain control over a non-producing well during suspension, completion or work-over operations. The role of the well control barriers of the present invention is to prevent all flow of hydrocarbons from the well.

13. The "barrier" described in the Patel reference is an External Casing Packer which is deployed in the annulus between the outer diameter of the casing string and the inner diameter of the well bore wall. An External Casing Packer is suitable to use for zonal isolation but is inherently unsuitable for use in the present invention. The reason for this is that an External Casing Packer provides no barrier to the flow of hydrocarbons from below the lowermost packer seal element through the internal bore of the completion string and thus cannot prevent the flow of hydrocarbons from the well. If an External Casing Packer were to be installed below the lowermost end of the completion string, the External Casing Packer itself would have an open internal bore through which hydrocarbons could freely flow. The External Casing Packer could not serve the

function of a deep set barrier unless modified in some way or used in conjunction with another type of well control barrier.

14. I have read and understood the specification filed for US patent 6,810,954 ("the Garrett reference"). The Garrett reference does not describe forming a completed assembly of a christmas tree with a tubing hanger landed in the body of the christmas tree and run into the well as a completed assembly. The present invention has made it possible for the first time to use two deep set barriers and independently verify the integrity of each of the two deep set barriers. It is this breakthrough that makes it possible for the first time to form a completed assembly (made up of the christmas tree plus tubing hanger plus completion string) above the water line and run this as a completed assembly to the well. Using standard industry practice, this would not be possible because the shallow barrier would be an obstruction that needs to be removed before running the completion into the well. As stated above at paragraph 4, using standard industry practice, the shallow barrier cannot be removed without first installing a BOP stack. It is not possible to run the christmas tree without first removing the BOP stack.

15. I note that Claim 22 of the Garrett reference describes the installation of a side valve tree onto a wellhead and the landing of the tubing hanger in the side valve tree as a separate and subsequent operation. The Garrett reference then describes the installation of an actuation mandrel in the side valve tree above the tubing hanger with the well control plugs being installed in the actuation mandrel instead of in the tubing hanger (which would otherwise be standard industry practice before the present invention). Although not expressly described in the Garrett reference, the well completion procedure would require the use of a BOP stack to supplement well control until the actuation mandrel has been installed. The side valve tree would be installed on the wellhead first. A BOP stack would then need to be run on top of the side valve tree, to supplement well control and allow the removal of the shallow barrier that would have been in place in the suspended well. The tubing hanger and tubing would be run into the well through the internal bore of the BOP stack in a separate operation to the running

of the tree. The BOP stack would be removed after the actuation mandrel (with its the plurality of well control barriers) has been installed.

16. Using the present invention, the tubing hanger, and the completion string can be installed in the christmas tree above the water line which provides a huge advantage in that we can verify the integrity of the hydraulic and electrical connections above the water line. In the Garrett reference, the tubing hanger is installed in the christmas tree sub-sea which is far more difficult and expensive.

17. I see no connection between the Garrett reference and the Patel reference whatsoever.

18. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

Paul Anthony Kelley
Date: 12/1/06

Witness: Dr Marguerite Rosanne Port
Date: 12/1/06